

Corrections and Additions to the Findings in Appendix I of the
Draft Nationwide TSCA Permit
to Dispose of PCBs in the Deactivation Furnace Systems
of the Army Chemical Demilitarization Facilities

Fibers and Organics Branch
National Program Chemicals Division
Office of Pollution Prevention and Toxics
Office of Prevention, Pesticides and Toxic Substance
Environmental Protection Agency

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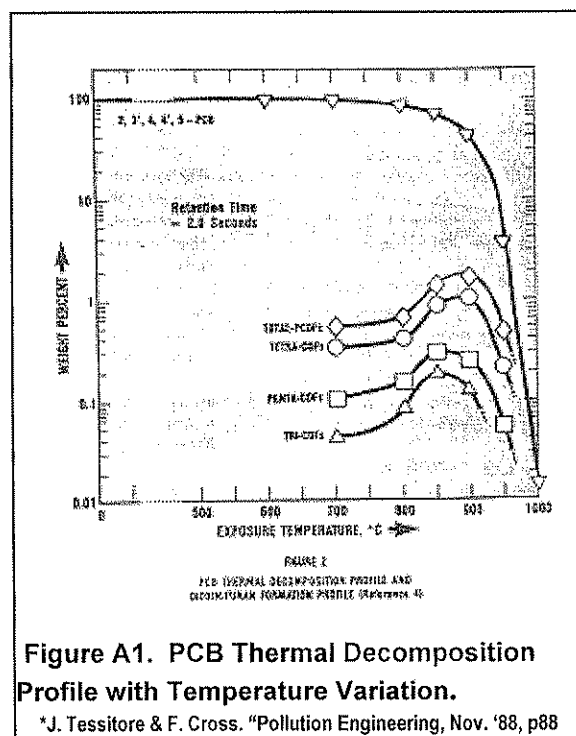
9. Trial Burn II 1998: The Army's results from the TOCDF Trial Burn II completed in November 1998 indicated that the TSCA incinerator requirements for 99.9999% destruction and removal efficiency (six 9s DRE) of PCBs were achieved. PCB emission rates were at minimum an order of magnitude lower than the health risk assessment (HRA). Dioxins and furans were not detected in the stack samples.

10. In 1974 the American National Standard Institute, Inc. (ANSI) published the "Guidelines for Handling and Disposal of Capacitor- and Transformer-Grade Askarels Containing Polychlorinated Biphenyls." For the disposal of liquid PCB waste, Section 3.5.2.1 of the guidelines require a balance between dwell time and temperature plus oxygen availability for proper incineration and suitable scrubbers to remove the hydrogen chloride that is formed. A dwell time of 2 seconds at 2000°F and 3% excess oxygen in stack gas, or a 1.5 dwell time at 2700°F and 2% excess oxygen in the stack gas are two combinations presented.

11. EPA published recommended procedures for the disposal of liquid waste, based on the ANSI guidelines, in the April 1, 1976 issue of the Federal Register. At that time, disposal procedures for PCBs in solid waste were not established. Disposal conditions for liquid PCBs and non-liquid PCBs were proposed on May 24, 1977. For liquids, these conditions were: $1200^{\circ}\text{C} \pm 100^{\circ}\text{C}$ ($2192^{\circ}\text{F} \pm 180^{\circ}\text{F}$), 2 seconds dwell time, and 3% excess oxygen in the stack gas. These conditions do not apply to non-liquid PCBs, however, a mass emission requirement better known as the six 9s DRE requirement was established for non-liquid PCBs. EPA promulgated the disposal regulations on May 31, 1979.

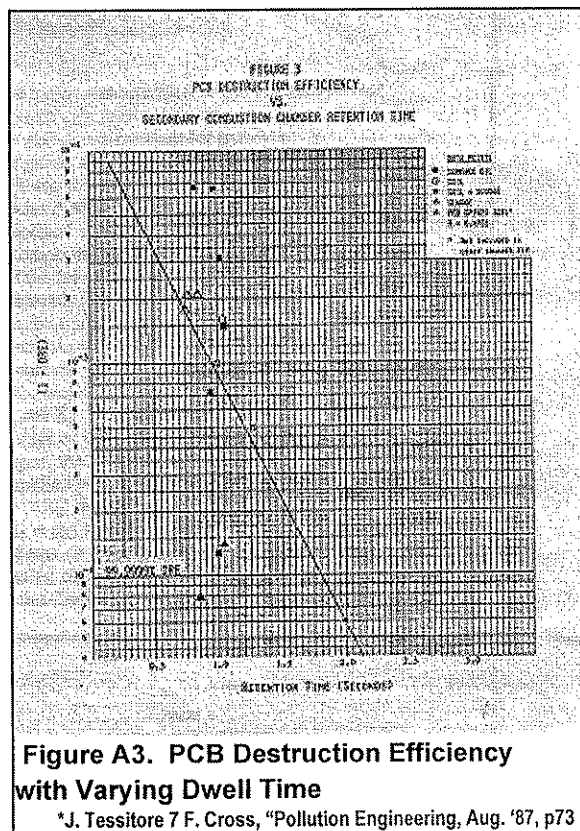
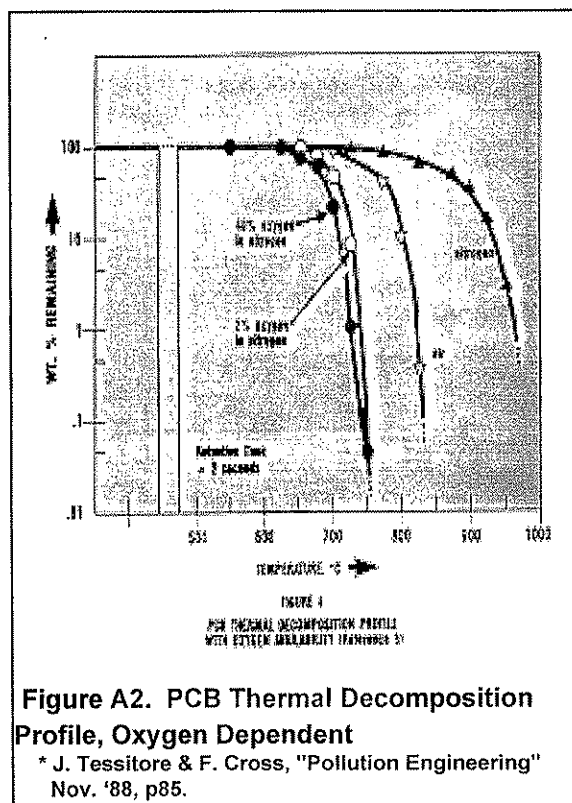
12. Scientific studies confirm the destruction of PCBs when the ANSI-recommended conditions are followed. One study exhibited effective destruction of PCBs at greater than 1000°C (1842°F) and a retention time of 2.0 seconds (see Figure A1). The same study indicated effective destruction of PCBs with a retention time of 2 seconds and varying concentration of oxygen (see Figure A2). The destruction effectiveness noticeably improved as the oxygen level increased from 0% (pure nitrogen) to 21% (air) to mixtures of pure oxygen in pure nitrogen (2% and 40%).

13. Complying with requirements for the incineration of PCBs, EPA Region 6, issued a PCB Disposal permit to Rollins Environmental Services, Inc. of Deer Park, Texas after successful completing a PCB incineration test in November 1979. The tests verified ANSI's recommended operating conditions conform to results of the



study previously mentioned. Using a feed stock containing 35% PCB, the test results indicated a destruction efficiency of > 99.99997% and a combustion efficiency of 99.993%. Operating conditions included a temperature of 1146°C (2095°F) minimum, a dwell time of 2.68 seconds, and an oxygen concentration of > 7%.

14. A study to verify PCB destruction of PCB in contaminated solid waste was performed using various media including soil and lagoon sediment from a remediation site. These material contained low level PCBs ranging from 79 to 296 ppm PCBs. Low level PCBs combined with high moisture content in the feed material resulted in difficulty achieving the six 9s DRE. However, extrapolation of the data estimated the conditions which would attain the DRE requirement. Figure A3 presents data plotting retention time versus DRE. The two points at the bottom of the chart were not included in the extrapolation. These two data



point were results from solid waste spiked with PCBs to above 7500 ppm levels. Combustion temperatures ranged from 2041°F to 2215°F. The retention time estimated to achieve the six 9s DRE is 1.8 sec.

Figure A4 plots data which estimate six 9s DRE achievement when oxygen content reaches 11% oxygen level. Again the two points at the bottom were not included in the extrapolation. This study concludes that six 9s DRE may be achieved although the solid waste contains high levels of moisture when retention time is above 1.8 seconds and with elevated levels of oxygen.

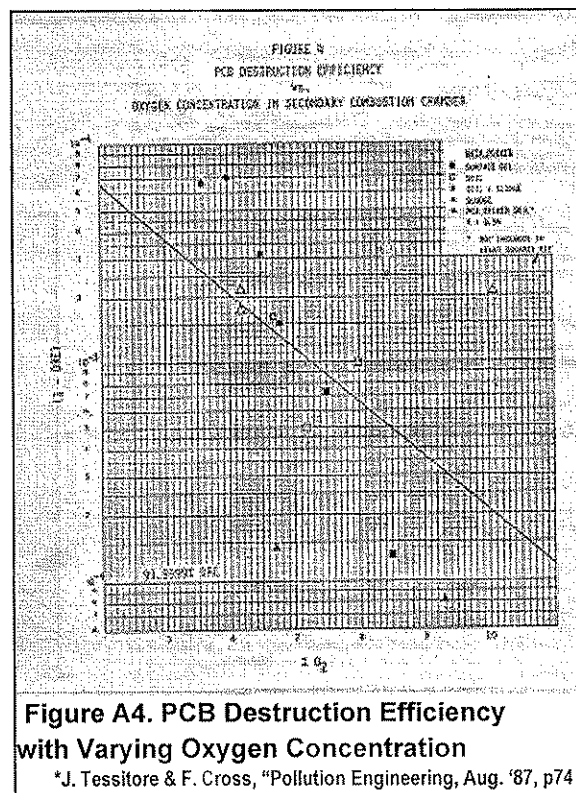
15. Destruction of PCBs in solid waste was demonstrated in May 1988 during tests performed by Roy F. Weston, Inc. (Weston) to obtain a nationwide TSCA PCB Disposal Approval. Weston achieved six 9s DRE

incorporating the following range of operating conditions:

temperature: 2,191°F - 2,202°F
 retention time: 2.08 - 2.11 seconds
 oxygen: 13.2 - 13.8 %
 solid waste PCB level: 10,819 - 19,323 ppm.

Weston achieved the required destruction levels with solid waste containing higher levels of PCBs. However, Ogden Environmental System (OES) demonstrated their Circulating Bed Combustor for TSCA approval in September of 1988 at the Kenai Peninsula, Alaska with solid waste containing low levels of PCBs. Operating conditions for the OES unit were in the following range:

temperature: 1,605°F - 1,701°F
 retention time: 1.47 - 1.68 seconds
 oxygen: 4.4 - 5.3 %
 solid waste PCB level: 338 - 603 ppm.



EPA issued both the Weston unit and the OES unit nationwide approvals to dispose of PCBs. They were mobile or transportable units with capability of being disassembled and transported from one location to another to treat solid waste containing PCBs.

16. Undrained Rockets: A portion of the GB M55 Rockets contained solidified or gelled chemical agent. Solidification of the agent prevented full drainage of the rocket warhead. During Post-Trial-Burn operations under Utah's RCRA permit and Interim Operations under TSCA, the Utah Department of Environmental Quality approved the incineration of about one undrained rocket per hour. During full scale operations, the Utah Agency approved the incineration of one undrained rocket every 37 minutes or about two rockets per hour. These feed rates complied with the feed rate limit for the incineration of GB chemical agent under the RCRA Program. GB agent was not detected in the stack gas during incineration operations. Under TSCA, the approved rate for Interim Operations and full scale processing is 33 rockets per hour, or more appropriately, the PCB contained in 33 rockets per hour. EPA believes that PCB emissions from processing of two rockets per hour will be nearly proportionate from that of processing 33 rockets per hour or about one-seventeenth the emissions from incineration of 33 rockets per hour.

The operating conditions, i.e., the waste feed operation which include the sectioning of rockets and the feeding sequence, and the combustion temperature and residence time, comply with operating conditions as specified under this approval and reflect operating conditions during Trial Burn 2. Scientific studies and comprehensive testing of numerous incinerator units have verified that destruction of PCB is effective under conditions paralleling those conditions maintained during Trial Burn 2 of the TOCDF Deactivation Furnace System. Based on Trial Burn 2 test results, the target operating conditions imposed by this Approval is:

temperature:	2150°F
retention time:	2 seconds
oxygen:	10 %

The permit conditions compare favorably with those required by the PCB Disposal regulations, the scientific studies and those of other permitted incinerators. Therefore, EPA believes that incineration of two undrained rockets per hour will not present an unreasonable risk to human health and the environment.

17. The TOCDF demonstrated and EPA finds that the DFS meets or exceeds the operating performance criteria for incineration of non-liquid PCBs under 40 CFR 761.70. The currently accepted performance level for EPA-approved incinerators is 99.9999% destruction and removal efficiency (DRE) for PCBs. The Agency has judged that these criteria are met and that the operation of this thermal destruction technology will not present an unreasonable risk to human health or the environment.